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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/660,054

09/11/2003

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EXAMINER

CROUSE, BRETT ALAN

ART UNIT

PAPER NUMBER

1794

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/660,054	<b>Applicant(s)</b> YAMANE ET AL.	
	<b>Examiner</b> Brett A. Crouse	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 March 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 37,40,59,76,84-87 and 96-105 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 37,40,59,76,84-87 and 96-105 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 28 March 2008 has been entered.
2. The amendment filed 28 March 2008 amends claims 37, 59, 76, 84 and 87, and adds new claims 96-103.
3. The supplemental amendment filed 28 April 2008 adds new claims 104 and 105. Claims 37, 40, 59, 76, 84-87 and 96-105 are pending.

### ***Response to Amendment***

4. The rejections of:  
  
claims 37, 40, 47, 66, 69, 76, 83, 85-88, 90, 92, 94 under 35 U.S.C. 103(a) as being unpatentable over Gause et al., US 3,895,158, in view of (Paper on Web, <http://www.paperonweb.com/density.htm>) and in view of Yuhas et al., US 5,350,621;  
  
claims 37, 40, 47, 66, 69, 76, 83, 85-87 under 35 U.S.C. 103(a) as being unpatentable Yuhas et al., US 5,350,621, in view of (Paper on Web, <http://www.paperonweb.com/density.htm>);

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claims 88-95 under 35 U.S.C. 103(a) as being unpatentable over Yuhas et al., US 5,350,621, in view of Paper on Web, as applied to claims 37, 40, 47, 66, 69, 76, 83, 85-87 above, and further in view of Kawakita et al., US 5,960,538;

and;

claims 59 and 84 under 35 U.S.C. 103(a) as being unpatentable over Yuhas et al., US 5,350,621, in view of Paper on Web, as applied to claims 37, 40, 47, 66, 69, 76, 83, 85-87 above, and further in view of Nakatani et al., US 6,096,411;  
are overcome by the amendment, filed 28 March 2008.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 37, 40, 76, 85-87 and 96-105 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakita et al., US 5,960,538, in view of Gause et al., US 3,895,158, in view of Yuhas et al., US 5,350,621 and in view of Arlon Inc., "Non-woven aramid reinforcements", March 27, 1995.

Kawakita teaches:

Column 3, lines 15-24, teach the fabric sheet is preferably a nonwoven fabric of synthetic fiber. The passage additionally teaches the sheet can be aramid.

Column 3, lines 27-60, teach a method of making a printed circuit board.

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Column 3, line 61 through column 4, line 39, teach additional methods of making a circuit board.

Column 6, lines 42-45, teach conductive resin pastes containing conductive particles filling the through holes.

Column 10, line 51 through column 14, line 65, examples 1-4, provide examples of circuit boards formed by the methods taught by Kawakita.

Kawakita does not teach:

Kawakita is silent with respect to the density of the aramid-epoxy sheet(s) used as the prepreg(s) of the examples. However, Kawakita provides multiple layer prepregs having at least three layers. (i.e. a first, second and third layer)

Arlon Inc teaches:

Arlon Inc. teaches aramid sheets for use in printed wiring boards. Core thickness constructions can be formed of a desired thickness by combining multiple plies of various styles of non-woven aramid sheets. Tables 7 and 8 present style summaries and constructions comprising multiple styles. The basis weights of the various styles when the thickness is accounted for result in layers of differing density. The basis weights presented when converted to  $\text{kg/m}^3$  are 674, 715 and 770 for E210, E220 and E230 respectively. Page 5 teaches prepregs and finished laminates and page 6 teaches epoxy and polyimide resins as commonly used resins which are also used for glass laminates. Figure 4 presents the CTE of various resin percentages. The resins selected were used throughout the layers of the laminate.

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It would have been obvious to one of ordinary skill in the art to select a combination of the styles of Arlon Inc. and incorporate them into the prepreg of Kawakita in order to produce a core laminate of desired thickness and density.

Gause teaches:

Column 3, lines 15-38, teach a laminate structure comprising resin impregnated cellulosic fiber paper layer(s) between resin impregnated woven glass fiber layers. The paper layers can be partially cured to the B-stage. Additionally, metal foils can be added to the outer woven glass fabric layers. The laminates can additionally be drilled and punched.

Column 4, lines 41-60, teach formation of the resin impregnated glass fabric layer(s). The layers are partially cured to a B-stage, thus teaching a semi-cured thermosetting resin.

Column 5, lines 25-30, teach that a resin rich surface can be provided upon the impregnated layer(s). This is held to teach a resin layer formed on the fiber sheet.

Column 7, line 39 through column 9, line 46, example 1 and Column 10, lines 1-9, example 3, teach as example 3 laminate structure, formed by the method of example 1, having paper layer(s) sandwiched between glass fabric layers in which identical resins are used in the paper layer(s) and glass fabric layer(s).

Yuhas teaches:

Yuhas et al., column 2, lines 54-56, teaches the resin percentage of the laminate of 50 to 57 percent.

Yuhas et al., column 6, lines 43-65, teaches that various configurations are known in the art. The passage also teaches that it is usual practice not to mix more than three types of fabrics or resins.

Yuhas et al., column 7, lines 45-67, teach that various combinations of materials and resins are suitable in order to achieve the desired characteristics.

Gause teaches it is known in the art to apply a resin rich layer upon a resin impregnated layer. Gause also teaches that the resin will penetrate into the fiber layer during treatment.

It would have been obvious to one of ordinary skill in the art to provide a resinous layer upon the surface of a fiber layer in the process of Kawakita in order to provide material that would penetrate into the fibers during processing.

7. Claims 59 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakita et al., US 5,960,538, in view of Gause et al., US 3,895,158, in view of Yuhas et al., US 5,350,621 and in view of Arlon Inc., “Non-woven aramid reinforcements”, March 27, 1995, as applied to claims 37, 40, 76, 85-87 and 96-105 above, and further in view of Nakatani et al., US 6,096,411.

The teachings of Kawakita in view of Gause/Yuhas/Arlon Inc. as in the rejection above are relied upon.

Kawakita in view of Gause/Yuhas/Arlon Inc does not teach:

Kawakita in view of Gause/Yuhas/Arlon Inc. does not recite non-spherical conductive particles as a component of the conductive paste. Conductive particles are taught generally, however only spherical particles are used in the examples.

Nakatani teaches:

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Column 2, lines 33-67, teach a conductive paste for filling inner via holes of a printed circuit board comprising a mixture of fine-grained copper particles and coarse grained insulating particles. The passage further teaches that it the paste provides low viscosity, low volatility, and high continuous printability.

Column 4, lines 34-35, teach the copper particles can be spherical or non-spherical in shape, for example flakes.

It is prima facie obvious that in the absence of unexpected results non-spherical conductive particles can be used in the conductive paste of Kawakita with the expectation that the resulting conductive paste will perform suitably as a via hole filler in a printed circuit board.

/Milton I. Cano/

Supervisory Patent Examiner, Art Unit 1794

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